

different at different places; and the fact that absorptometric exchange had not gone far enough to reproduce equilibrium would account for the few cases in which the dissolved gases exceeded the amount calculated. The interpretation of his results seemed unsatisfactory to Prof. Dittmar. He says (p. 182):—

"I am sorry to have to confess that I have not been as successful as I should have wished in drawing general conclusions from my numbers, and if I here reproduce my endeavours in this direction, I do so chiefly in the hope that some other person, having more experience than I in dealing with statistics, may take up the problem after me, and perhaps be able to extract the latent propositions which are therein concealed. In the tables which I propose to give, he will find all the data arranged in the most convenient form, so that all he needs is at hand."

The problem of the dissolved gases is very difficult when deep waters are considered. The method pursued by Dittmar was to find the amount of nitrogen absorbed, and to calculate the temperature at which that quantity would be taken up by water at the surface; then to find the corresponding amount of oxygen, and compare that with what was found by experiment. It is evident that if the ocean were stagnant in any part the processes of oxidation always going on would tend to reduce the amount of absorbed oxygen finally to nothing, while the amount of dissolved nitrogen would be unaltered, unless it were slightly increased by the decomposition of animal matter. In many cases the oxygen deficit was found to assume very large dimensions, though oxygen was never wholly absent from the dissolved gases.

Part I. of the volume closes with a summary of the chemical work, a note by Mr. Buchanan on the determination of carbonic acid, and an appendix describing some analytical methods. The summary contains a number of valuable suggestions for future work. These are divided under two heads, the first comprising such observations of water density and rough volumetric determinations of the alkalinity as can be carried on by any intelligent seafaring man after a little instruction. The second head includes work requiring the services of a skilled chemist for its accomplishment. It embraces further researches on the composition of ocean salts by determining with the utmost precision the amounts of the principal constituents for one particular station in the ocean, water from which could be collected in large quantity at various seasons; then it could be compared with water taken at various seasons from a widely distant station, and thus the interesting question as to whether there is *any* difference in the proportion of the salts in different oceans could be settled. The minor constituents should also be estimated if possible, and very particular attention ought to be paid to alkalinity and carbonic acid determinations in freshly drawn samples. Prof. Dittmar concludes with this significant suggestion:—

"Meanwhile the best thing that could be done in regard to all the analytical problems referred to would be to work many times on samples of the same kind of water, with a view of improving on the methods and ascertaining the extent to which that one water fluctuates in its composition."

The only way in which this can be done properly is in a laboratory on shore situated within easy reach of an abundant supply of sea water, and the support of such laboratories ought to be a leading feature in the marine stations several of which, it is to be hoped, will soon be in working order on our coasts. A beginning has already been made at the Scottish Marine Station at Granton, where the special chemical problem under investigation is estuary water. The *Challenger* results may be regarded as final, for the present at least, for ocean water proper, and the results of the German and Norwegian North Atlantic Expeditions have put the waters of partially enclosed seas on a permanent basis; but the study of

estuary water has been almost neglected. This is the more regrettable because of the practical importance of a correct knowledge of the conditions of the water of an estuary, on account of its bearing on the migration of fishes into firths and up tidal rivers.

There could be no better field than the estuaries of the British coast for carrying out Prof. Dittmar's suggestion of continuous work on one kind of sea water with a view to the perfecting of analytical methods; and the perfecting of analytical methods, important though it be, may safely be predicted to be one of the least valuable results of such researches.

HUGH ROBERT MILL.

ORNITHOLOGICAL NOTES

SEVERAL new magazines have made their appearance during the present year, the most important of them being undoubtedly the *Auk*, which is the name proposed for the journal of the American Ornithologists' Union, and which is to represent in America our old friend the *Ibis* of this country. The *Auk* is in fact a continuation of the *Bulletin* of the Nuttall Ornithological Club, and the general style of the work is the same. The papers seem to be interesting enough, but what strikes us as being decidedly above the average is the quality of the reviewing, which is developing into an art with our American brethren. Mr. Cory describes some new species of birds from Santo Domingo, the plate which accompanies his paper being scarcely up to the level of American illustration. Mr. Barrows continues his useful papers on the birds of Uruguay, and Prof. Merriam criticises Dr. Coues' "Check List," calling forth a sharp rejoinder from the last-named author in an article called "Ornithophilologicalities." In No. 2 many of the above-named papers are further continued along with others by Dr. Stejneger, who advocates some startling changes in ornithological nomenclature, and who also writes a useful paper on the genus *Acanthis*. Altogether, although the American ornithologists have elected to name their quarterly journal after a bird whose powers of flight were small, the excellence of the two numbers which have appeared reminds us of the perfection of that bird's powers of swimming and diving, so that they have taken as their symbol a species of lusty prowess which argues well for a continuation of the life and enterprise which is visible in the new magazine. We do not forget also that the *Auk* was a species common to Great Britain and North America, and therefore the very title is suggestive of a bond of union between British and American ornithologists which is certain to be strengthened with each succeeding year.

We have also received No. 1 of the *Bulletin* of the Ridgway Ornithological Club, which has been started in Chicago, and is named after Mr. Robert Ridgway, the well-known Curator of the Ornithological Department in the United States National Museum. The secretary of the new club is Mr. H. K. Coale, who is well known as a zealous and painstaking ornithologist, and under whose auspices there is doubtless a useful future before the infant society which he represents. The first number of the *Bulletin* contains only a single paper by Messrs. W. W. Cook and Otto Widmann, entitled "Bird Migration in the Mississippi Valley."

Mr. J. H. Gurney has just issued a "List of the Diurnal Birds of Prey, with References and Annotations; also a Record of Specimens preserved in the Norfolk and Norwich Museum," consisting of 187 pages. The *raison d'être* of this most useful work consisted in the publication of the first volume of the "Catalogue of Birds in the British Museum," by Mr. R. Bowdler Sharpe. The Norwich Museum, as is well known, contains one of the finest series of birds of prey in the world, and it will always be an imperishable monument to that true and self-sacrificing naturalist, Mr. J. H.

Gurney, through whose instrumentality this splendid collection has been brought together. The author commenced in 1875 an elaborate review of Mr. Sharpe's volume, giving a vast amount of additional information, principally founded upon the series of *Raptores* contained in the Norwich Museum. The complete list of the birds of prey which Mr. Gurney has now published contains an exact reference to these numerous critical papers in Mr. Sharpe's volume, but adds some of the principal synonyms, and gives the number of specimens contained in the Norwich Museum. The publication of this volume is certain to have one effect, which will take the form with all ornithologists of a hope that Mr. Gurney may feel able to continue his "Catalogue of the Raptorial Birds in the Norwich Museum," of which one part appeared some years ago; as it is certain that everything that emanates from his pen will be received with the greatest respect by his brother ornithologists, who have so long looked up to him as the greatest authority on the birds of prey.

UTRICULARIA VULGARIS

IT was proved many years ago that several of the aquatic and terrestrial plants distributed over various quarters of the globe preyed upon flies, larvæ, worms, crustaceans, and other species of small invertebrates.

For the greater part of the knowledge we have already received on this head we are indebted to the researches and experiments of Mr. Darwin, and I would refer any of my readers who may feel interested in the subject to his "Insectivorous Plants."

But until a few weeks since, when it was discovered by myself, and noted in NATURE by Prof. Moseley, that the bladder traps of the *Utricularia vulgaris* (Fig. 1) caught and destroyed newly-hatched fish, it was unknown that any of the recognised carnivorous plants possessed the power of also entrapping vertebrate animals, no single instance of the kind having been recorded by previous observers; yet it might at once have been naturally inferred, that, provided the experiment was made with creatures of a strength and size proportionate to the capacity of the organs of capture belonging to the plant, their action in every case would be precisely the same on either vertebrates or invertebrates. The *Utricularia vulgaris*, together with several other members of the same family bearing the generic name of *Utricularia*, and the specific, *neglecta*, *major*, *minor*, and *clandestina*, are very local in their habitat, growing in isolated patches in ponds and sluggish ditches, the type of place invariably selected by coarse fish to deposit their ova. This at once constitutes it as great an enemy to the small fry as the water-fowl and otters are to the larger fish in the streams, because for a considerable period after they emerge from the egg the young fish remain in the shallow water, and during this time innumerable quantities must be killed by the vesicles of the *Utricularia*.

Since I have been acquainted with the plant, I have noticed several peculiar circumstances in connection with it, which appear to have been entirely overlooked by all the botanical writers whose works I have consulted.

In the first place I have never seen it growing, unless displaced by the action of the wind, except on the darkest and shadiest side of the pond from whence I obtain my specimens, and then it is almost invariably hidden beneath other aquatic vegetation, as if its deeds caused it to shun the light. It also exhibits the same tendency to avoid particular spots which frequently is evinced by snakes in selecting only one side of a field or part of a hedge to the entire exclusion of the remainder, and by fish in choosing the dirtiest and most unlikely ditches as a spawning bed in preference to those which are cleaner and apparently in every respect better suited to the purpose.

I am of opinion that an excess of light is prejudicial to

the plant, because, if when kept in an aquarium it is exposed to the full glare of the daylight, the valves appear to lose their elasticity, and the vesicles become detached from the stem, and drop off.

Another predominating cause for this strange habit of growing in only one or two spots may perhaps be ascribed to this, that wherever I find the *Utricularia* there is always a luxuriant mass of *Confervæ* around it which harbours numberless insects, and, having no roots at any time of its life, is entirely dependent upon its vesicles for its sustenance; hence it only flourishes where prey is plentiful.

In confinement it is impossible to keep it in a healthy state unless the glass is darkened; and as nearly as possible its artificial condition is assimilated to its natural one. Where young fish are kept, it is anything but a desirable inmate of the vessel in which they are confined. One eminent piscicultural authority states that he had several

FIG. 1.

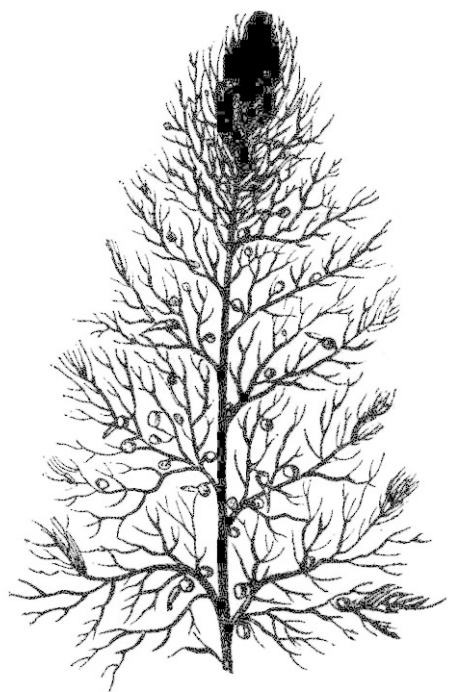


FIG. 3.



FIG. 2.

plants in his aquarium with some young axolotls, and he noticed that the small salamanders gradually disappeared; now he can give a very good guess where they went to.

My friend Mr. Kelson, who has recently had charge of my aquariums during my absence from home, agrees with me that the foliage possesses some poisonous properties detrimental to fish. Whether it does so or not I hesitate to assert, but all I know is that out of a batch of young roach placed with some freshly-gathered *Utricularia*, many of them in a little while lay dead on the branches.

With regard to its method of catching insects or anything upon which it preys, I believe that the processes are armed with tiny spines similar to the recurved teeth of a pike, or the serrations of an awn of barley, and these utilise the struggles of the creature caught to push it further on but prevent its return.

When a fish once touches one of the processes, whether